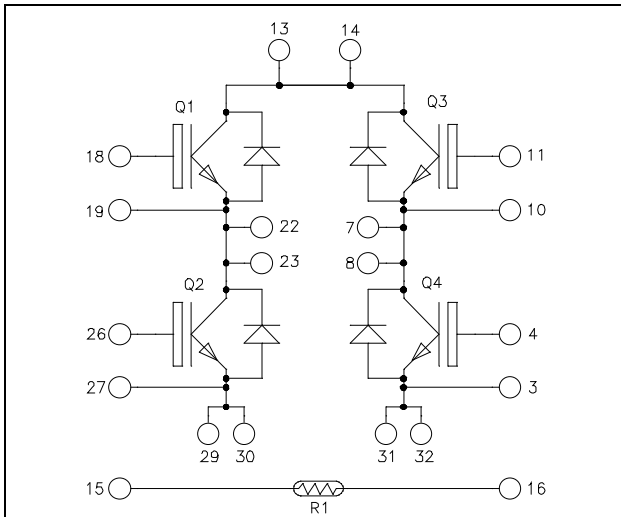


**Full bridge  
High speed Trench + Field Stop IGBT4  
Power Module**

**$V_{CES} = 1200V$   
 $I_C = 75A @ T_c = 80^\circ C$**



### Application

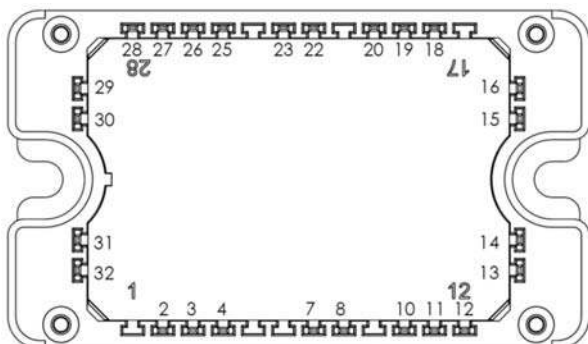
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

### Features

- **High speed Trench + Field Stop IGBT 4**
  - Low voltage drop
  - Low leakage current
  - Low switching losses
- Kelvin emitter for easy drive
- Very low stray inductance
- Internal thermistor for temperature monitoring

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- Easy paralleling due to positive TC of  $V_{CESat}$
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS compliant



All multiple inputs and outputs must be shorted together  
 Example: 13/14 ; 29/30 ; 22/23 ...

**All ratings @  $T_j = 25^\circ C$  unless otherwise specified**

### Absolute maximum ratings (per IGBT)

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Voltage	1200	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	130
		$T_c = 80^\circ C$	75
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	250
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Power Dissipation	385	W

 **CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

**Electrical Characteristics (per IGBT)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>CES</sub>	Zero Gate Voltage Collector Current	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1200V			50	μA
V <sub>CE(sat)</sub>	Collector Emitter Saturation Voltage	V <sub>GE</sub> = 15V I <sub>C</sub> = 75A	T <sub>j</sub> = 25°C 1.7	2.05	2.4	V
			T <sub>j</sub> = 150°C 2.6			
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 2.6 mA	5.0	5.8	6.5	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	V <sub>GE</sub> = 20V, V <sub>CE</sub> = 0V			150	nA

**Dynamic Characteristics (per IGBT)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C <sub>ies</sub>	Input Capacitance	V <sub>GE</sub> = 0V		4400		pF
C <sub>oes</sub>	Output Capacitance	V <sub>CE</sub> = 25V		250		
C <sub>res</sub>	Reverse Transfer Capacitance	f = 1MHz		235		
Q <sub>G</sub>	Gate charge	V <sub>GE</sub> = 15V, I <sub>C</sub> = 75A V <sub>CE</sub> = 960V		325		nC
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (25°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 75A R <sub>G</sub> = 7Ω		30		ns
T <sub>r</sub>	Rise Time			57		
T <sub>d(off)</sub>	Turn-off Delay Time			290		
T <sub>f</sub>	Fall Time			16		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (150°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 75A R <sub>G</sub> = 7Ω		30		ns
T <sub>r</sub>	Rise Time			49		
T <sub>d(off)</sub>	Turn-off Delay Time			366		
T <sub>f</sub>	Fall Time			48		
E <sub>on</sub>	Turn on Energy	V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 75A R <sub>G</sub> = 7Ω	T <sub>j</sub> = 25°C	5.5		mJ
			T <sub>j</sub> = 150°C	6.4		
E <sub>off</sub>	Turn off Energy		T <sub>j</sub> = 25°C	2.05		
			T <sub>j</sub> = 150°C	3.84		
I <sub>sc</sub>	Short Circuit data	V <sub>GE</sub> ≤ 15V ; V <sub>Bus</sub> = 900V t <sub>p</sub> ≤ 10μs ; T <sub>j</sub> = 150°C		260		A
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.39	°C/W

**Diode ratings and characteristics (per diode)**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V <sub>RRM</sub>	Peak Repetitive Reverse Voltage				1200	V
I <sub>RM</sub>	Reverse Leakage Current	V <sub>R</sub> = 1200V			150	μA
I <sub>F</sub>	DC Forward Current	T <sub>c</sub> = 80°C		60		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 60A		2.6	3.1	V
		I <sub>F</sub> = 120A		3.2		
		I <sub>F</sub> = 60A	T <sub>j</sub> = 125°C	1.8		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 60A V <sub>R</sub> = 800V di/dt = 400A/μs	T <sub>j</sub> = 25°C	300		ns
			T <sub>j</sub> = 125°C	380		
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>j</sub> = 25°C	720		nC
			T <sub>j</sub> = 125°C	3400		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.65	°C/W

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com)).

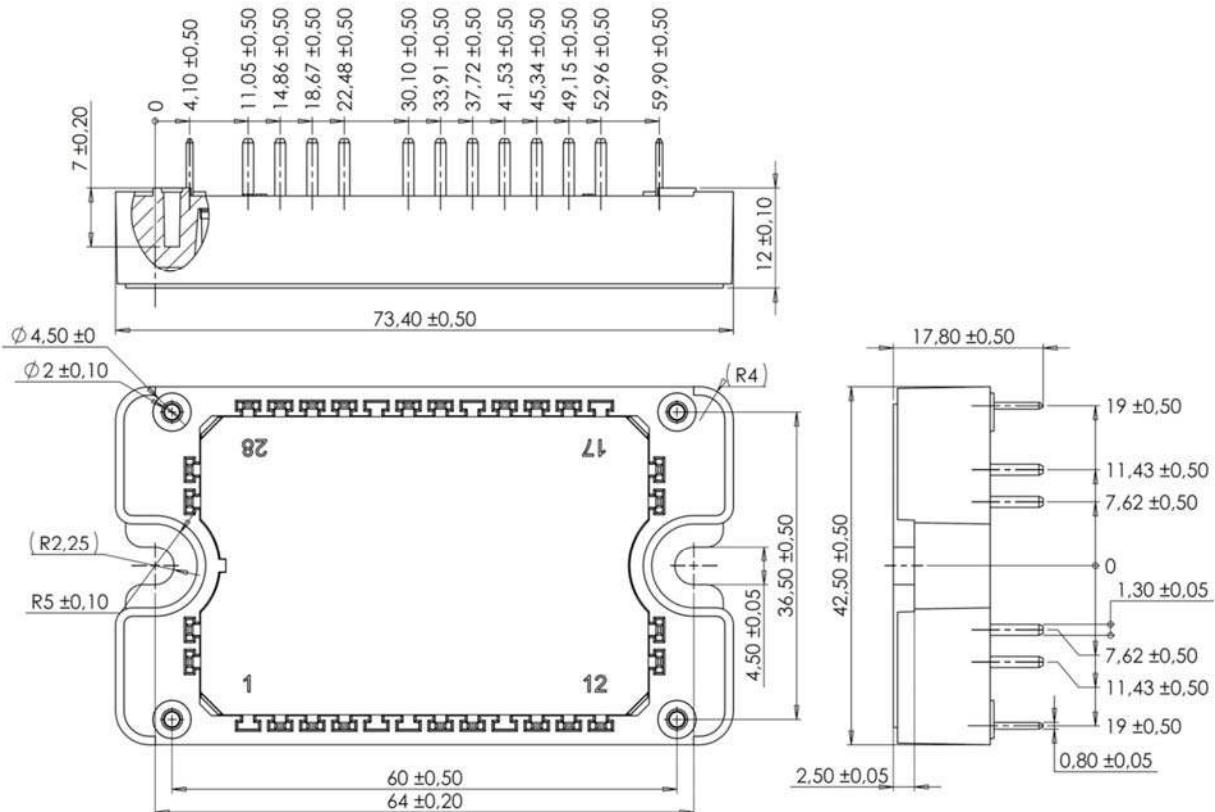
Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K
ΔB/B	T <sub>C</sub> = 100°C		4		%

$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

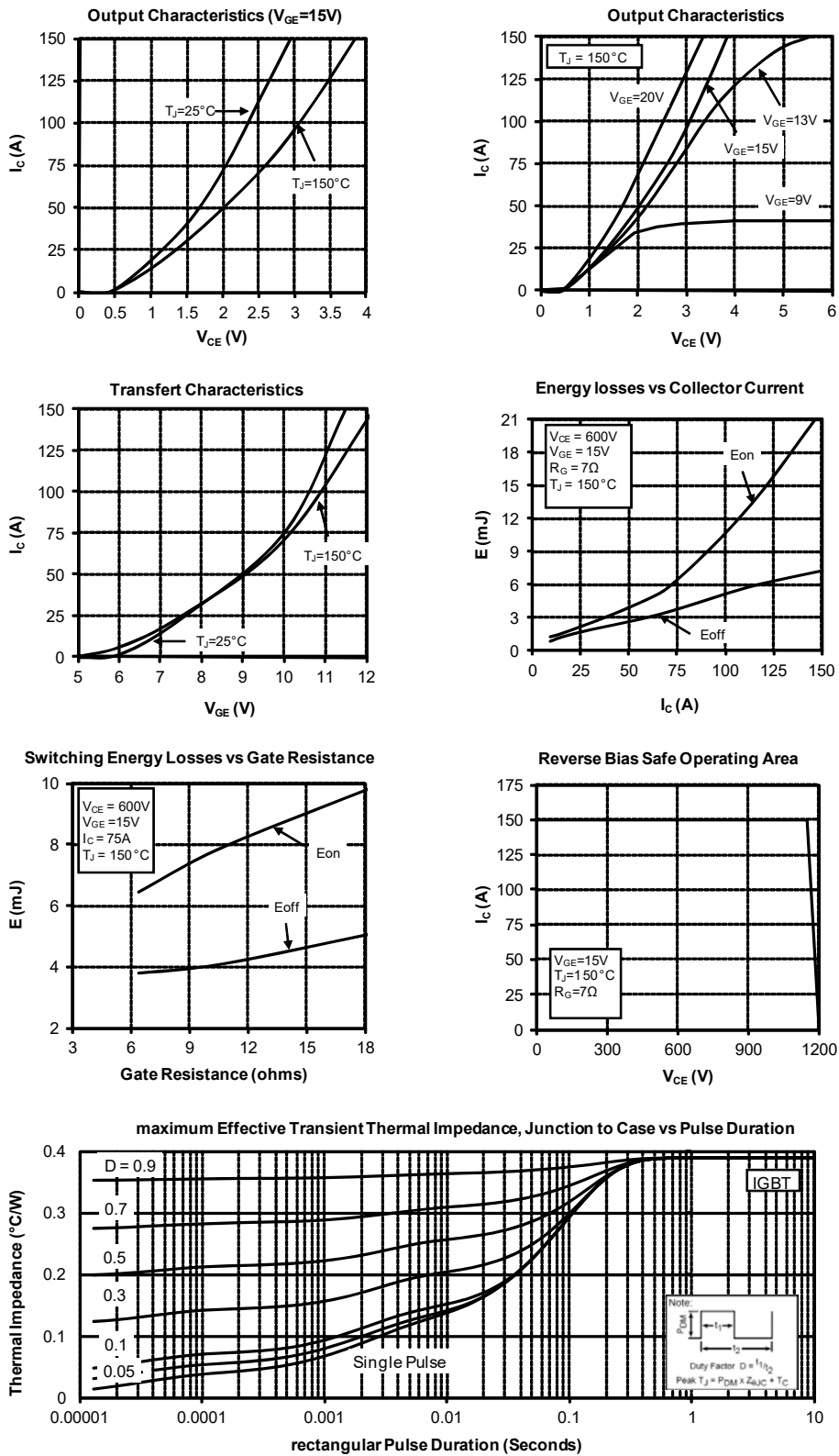
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

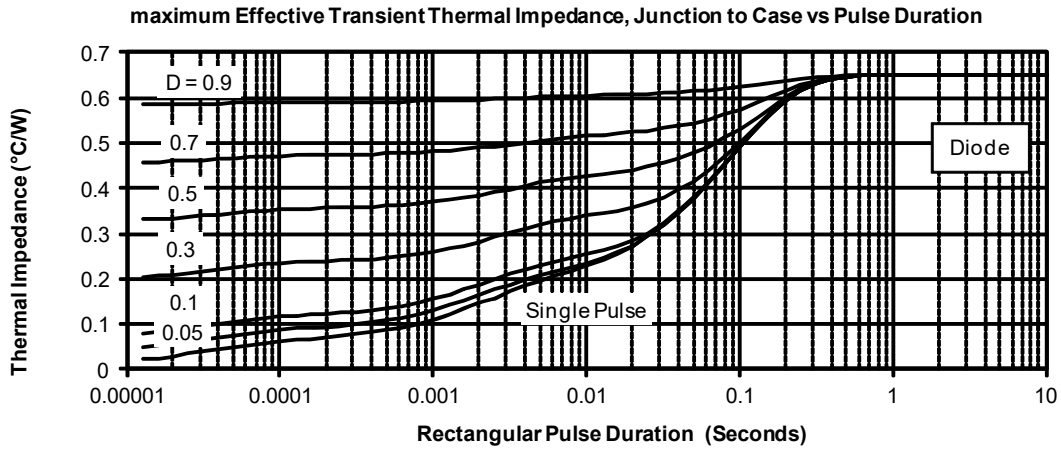
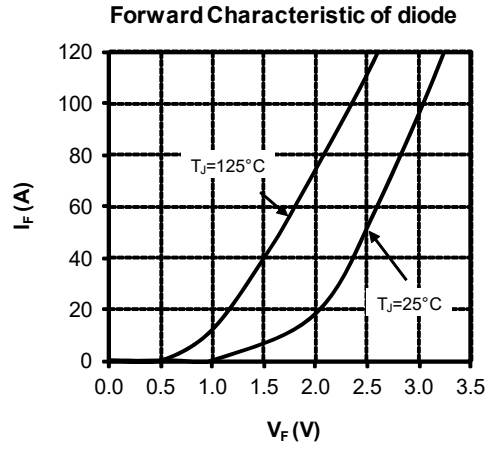
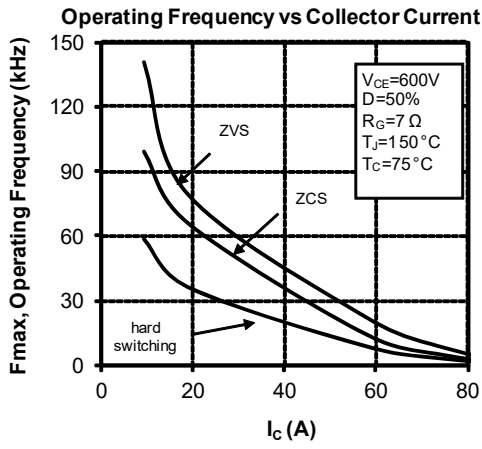
**Thermal and package characteristics**

Symbol	Characteristic	Min	Max	Unit		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V		
T <sub>J</sub>	Operating junction temperature range	-40	175	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>max</sub> -25			
T <sub>STG</sub>	Storage Temperature Range	-40	125			
T <sub>C</sub>	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

**Package outline (dimensions in mm)**

 See application note 1906 - Mounting Instructions for SP3F Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical performance curve





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